

# UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 49520  
CSAH NO. 1  
OVER THE  
CROW WING RIVER  
DISTRICT 3 - MORRISON COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION  
BY  
COLLINS ENGINEERS, INC.  
JOB NO. 5221 (CEI 65)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 49520, Piers 1, 2, and 3, were found to be in good and sound condition below water, with no defects of structural significance and no appreciable changes since the last underwater inspection. The extent of footing exposure at Piers 1 and 2 was comparable to the last inspection findings, and the channel bottom has remained mostly unchanged and stable with no significant scour.

INSPECTION FINDINGS:

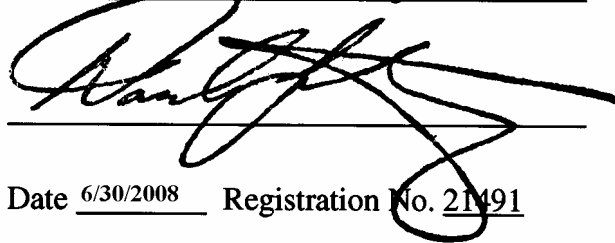
- (A) The top of the footing was exposed at Piers 1 and 2, with no vertical exposure along the north face of Pier 1, and with up to 1 foot of vertical exposure at the upstream end of Pier 2. A 6-inch-diameter area of section loss was also observed on the southwest corner of the exposed footing at Pier 2 with up to 1/2 inch of penetration.
- (B) Minor scour depressions were observed at the upstream end of each of the piers ranging from 1.5 feet deep with a radius of 3 feet at Pier 3, to 1 foot deep with a radius of 4 feet at Piers 1 and 2.
- (C) A moderate to heavy accumulation of 2-foot-diameter and smaller timber debris was observed at the upstream end of Pier 2. The debris extended from the channel bottom up 7 feet, 5 feet north, 20 feet south, and 15 feet west.

RECOMMENDATIONS:

- (A) Monitor the timber debris at Pier 2, and if found to be increasing in the future, removal operations may become warranted.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years, and continue to monitor extent of footing exposure at all piers.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

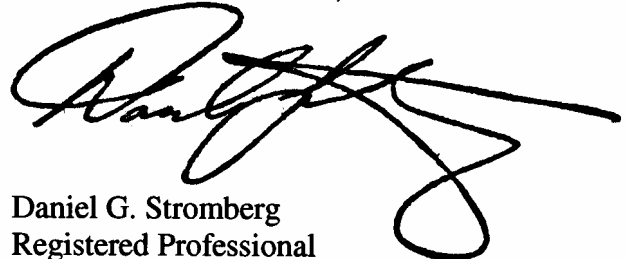
Daniel G. Stromberg

A large, stylized handwritten signature in black ink, appearing to read 'Dan G. Stromberg', is written over a horizontal line.

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

A large, stylized handwritten signature in black ink, appearing to read 'Dan G. Stromberg', is written over a horizontal line.

Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 49520

Feature Crossed: Crow Wing River

Feature Carried: CSAH No. 1

Location: District 1 - Morrison County

Bridge Description: The superstructure consists of four spans of multiple prestressed concrete beams. The superstructure is supported by two reinforced concrete abutments and three reinforced concrete piers. The abutments and piers are founded on timber piles. The piers are numbered 1 through 3 from south to north across the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Bradley A. Syler, P.E., S.E.

Dive Team: John J. Loftus, Valerie Roustan

Date: August 16, 2007

Weather Conditions: Sunny, 69°F

Underwater Visibility: 4.0 feet

Waterway Velocity: 0.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1, 2, and 3

General Shape: The pier shafts are oblong and rectangular with rounded ends, and are founded on rectangular footings supported by piles.

Maximum Water Depth at Substructure Inspected: Approximately 13.1 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the west end of Pier 2.

Water Surface: The waterline was approximately 15.0 feet below reference  
Water Elevation = 1177.1.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 6

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code I/91

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

       Yes      X   No





Photograph 1. Overall View of the Structure, Looking West.



Photograph 2. View of Pier 1, Looking Southwest.





Photograph 3. View of Pier 2, Looking Northeast.



Photograph 4. View of Pier 3, Looking Northeast.



A diagram showing a vertical pipe with a rectangular base. From the bottom of the base, four dashed lines extend downwards, each ending in a small hook-like shape.

1. Piers 1, 2, and 3 were inspected underwater.
2. At the time of inspection on August 16, 2007, the waterline was located 15.0 feet below the top of cap on the upstream end of Pier 2. This corresponds to a waterline elevation of 1177.1 feet based on the previous report dated September 26, 2002.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

-6.0	Sounding Depth (8/16/07)
-6.0	Sounding Depth (9/26/02)

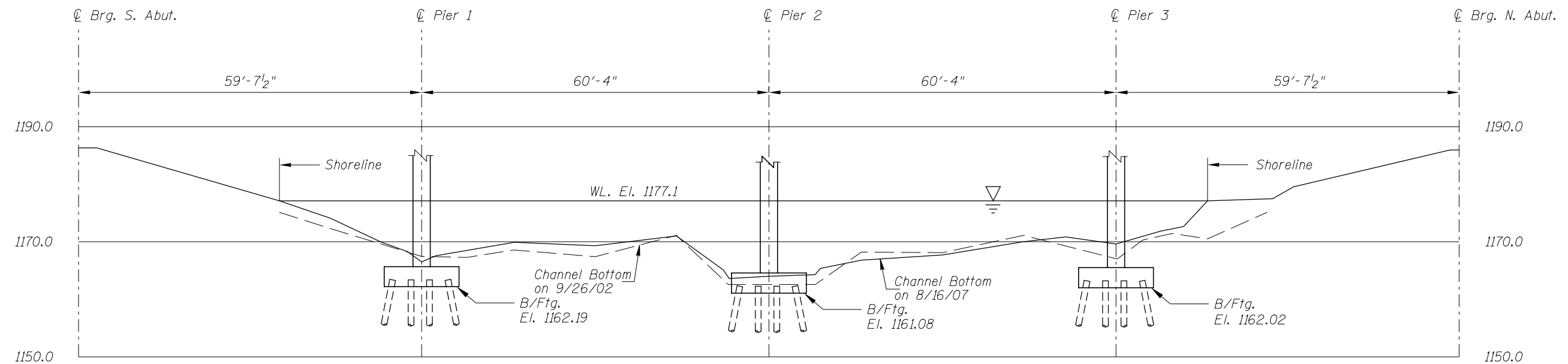
 *Riprap*

*All soundings based on 2007 waterline location.*

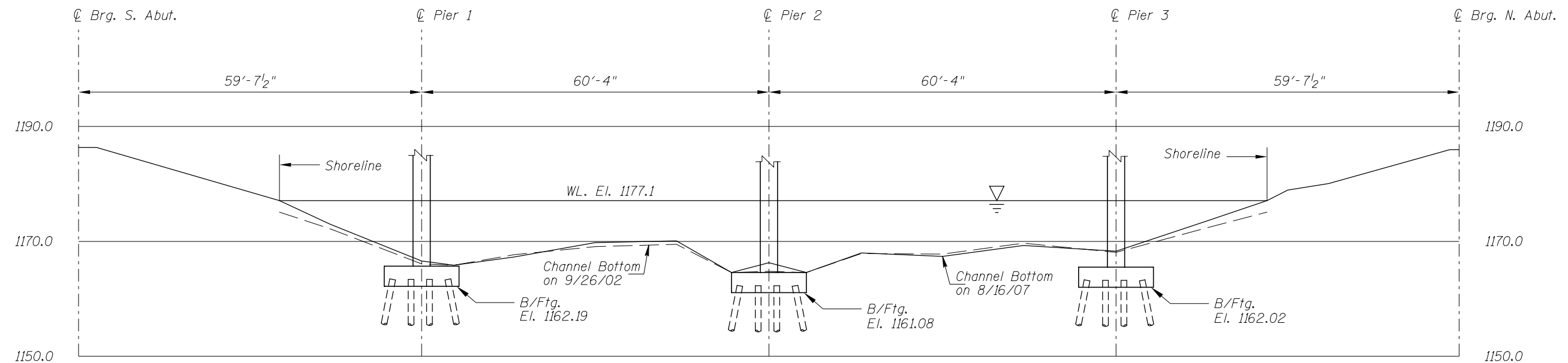
- 1 The channel bottom consisted of firm sandy gravel, 6-inch cobbles, and occasional 1- to 2-foot-diameter riprap with a maximum probe rod penetration of 2 inches.
- 2 A moderate to heavy accumulation of 2-foot-diameter and smaller timber debris was observed at the upstream end of Pier 2, extending vertically 7 feet from the channel bottom, and extending up to 5 feet from the north face, 20 feet from the south face, and 15 feet west of the upstream end.
- 3 The embankments consisted of sandy slopes with minor erosion and a 4-foot band of 1- to 2-foot-diameter riprap along the shoreline.
- 4 The concrete was generally smooth and sound with random minor areas of poor consolidation with up to 1/2 inch penetration.
- 5 The footing was exposed along the entire west and east faces and at the upstream end of Pier 2 with up to 1 foot of vertical exposure at the upstream end.
- 6 The footing was exposed from downstream 1/4 point to the upstream nose along the north face of Pier 1 with no vertical exposure.
- 7 A 3-foot-radius, 1.5-foot-deep scour pocket was observed at the upstream end of Pier 3.
- 8 A 4-foot-radius, 1-foot-deep scour pocket was observed at the upstream end of Piers 1 and 2.
- 9 The southwest corner of the exposed footing exhibited a 6-inch-diameter area of section loss with up to 1/2 inch of penetration.
- 10 A concrete pier from the previous bridge was encountered 5 feet below the waterline.

<p align="center"><b>MINNESOTA</b>  <b>DEPARTMENT OF TRANSPORTATION</b>  <b>UNDERWATER BRIDGE INSPECTION</b></p>		
<p align="center">STRUCTURE NO. 49520  OVER THE CROW WING RIVER  DISTRICT 3, MORRISON COUNTY</p>		
<p align="center">INSPECTION AND SOUNDING PLAN</p>		
<p>Drawn By: PRH</p>	<p><b>COLLINS</b>  <b>ENGINEERS</b></p>	<p>Date: AUGUST, 2007</p>
<p>Checked By: MDK</p>		<p>Scale: NTS</p>
<p>Code: 52210065</p>		<p>Figure No.: 1</p>





UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 49520  
OVER THE CROW WING RIVER  
DISTRICT 3, MORRISON COUNTY  
**UPSTREAM AND DOWNSTREAM  
FASCIA PROFILES**

Drawn By: PRH	<b>COLLINS</b> <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007
Checked By: MDK		Scale: 1"=20'
Code: 52210065		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES  
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 16, 2007

ON-SITE TEAM LEADER: Bradley A. Syler, P.E., S.E.

BRIDGE NO: 49520 WEATHER: Sunny, 69°F

WATERWAY CROSSED: Crow Wing River

DIVING OPERATION: X SCUBA          SURFACE SUPPLIED AIR  
         OTHER

PERSONNEL: John J. Loftus, Valerie Roustan

EQUIPMENT: SCUBA, U/W Light, Scraper, Lead Line, Sounding Pole, Fathometer, Probe  
Rod, Camera

TIME IN WATER: 11:30 P.M.

TIME OUT OF WATER: 12:15 P.M.

WATERWAY DATA: VELOCITY 0.5 f.p.s.

VISIBILITY 4.0 feet

DEPTH 13.1 feet maximum at Pier 2

ELEMENTS INSPECTED: Piers 1, 2, and 3

REMARKS: Overall, the submerged concrete of the piers was smooth and sound with random minor areas of poor consolidation. The top of the footing was exposed at Piers 1 and 2 with no vertical exposure along the north face of Pier 1, and up to 1 foot of vertical exposure at the upstream end of Pier 2. There was a 6-inch-diameter area of section loss observed on the southwest corner of the exposed footing with 1/2 inch penetration. A moderate to heavy accumulation of 2-foot-diameter-and-smaller timber debris was observed at the upstream end of Pier 2. Each of the piers exhibited scour pockets at the upstream end of the piers ranging from 1.0 feet deep with a radius of 4 feet at Piers 1 and 2, to 1.5 feet deep with a radius of 3 feet at Pier 3.

FURTHER ACTION NEEDED:          YES X NO

Monitor the timber debris at Pier 2, and if found to be increasing in the future, removal operations may become warranted.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years, and continue to monitor extent of footing exposure at all piers.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 49520  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Bradley A. Syler, P.E., S.E.  
WATERWAY CROSSED Crow Wing River

INSPECTION DATE August 16, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	11.3'	N	8	7	9	N	7	6	7	8	N	6	8	N	N	N	N	N
	Pier 2	13.1'	N	8	7	9	N	7	6	N	N	6	6	8	N	N	8	N	N
	Pier 3	10.3	N	8	N	9	N	8	7	6	7	N	6	8	N	N	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the submerged concrete of the piers was smooth and sound with random minor areas of poor consolidation. The top of the footing was exposed at Piers 1 and 2 with no vertical exposure along the north face of Pier 1, and up to 1 foot of vertical exposure at the upstream end of Pier 2. There was a 6-inch-diameter area of section loss observed on the southwest corner of the exposed footing with 1/2 inch penetration. A moderate to heavy accumulation of 2-foot-diameter-and-smaller timber debris was observed at the upstream end of Pier 2. Each of the piers exhibited scour pockets at the upstream end of the piers ranging from 1.0 feet deep with a radius of 4 feet at Piers 1 and 2, to 1.5 feet deep with a radius of 3 feet at Pier 3.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.  
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.